ASBESTOS SURVEY INVENTORY
SPOKANE INTERNATIONAL AIRPORT
AIR TRAFFIC CONTROL TOWER
SPOKANE, WASHINGTON

PREPARED FOR:

FEDERAL AVIATION ADMINISTRATION
NATIONAL HEADQUARTERS
AIRWAY FACILITIES DIVISION ANS-204
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LIST OF APPENDICES

OTHER

1.1 INTRODUCTION

This asbestos inspection report presents data which describe the condition and location of Asbestos-Containing Material in the Spokane International Airport Air Traffic Control Tower (ATCT). Asbestos-Containing Material (ACM) is defined as any material with an asbestos content of greater than one percent by area/volume. This report is to be used as a program planning tool for all construction and maintenance activities scheduled at this ATCT.

All ACM identified in this report should be handled in accordance with all applicable federal, state and local regulatory requirements. This inspection report should also be used in conjunction with the FAA Operations and Maintenance Policy Manual for Asbestos-Containing Materials to insure minimal employee exposure and compliance with FAA management policy. All affected individuals should be trained to use this inspection report in conjunction with planned Operations & Maintenance (O&M) activities or renovations so that these activities are carried out properly. This will prevent potential exposure to airborne asbestos fibers or the creation of an emergency abatement or clean-up operation.

The combined goals of sampling and visual assessments follow:

1) identify all ACM at the facility and document the condition, friability, location, and quantity of each identified material, and

2) coordinate sample data information and observations obtained from the site visits into a report form, parts of which will be incorporated into the facility O&M Manual, where applicable.

1.2 INSPECTION AND SAMPLING PROCEDURE

All inspection procedures and sample collections were conducted in accordance with AHERA and EPA guidelines.

An initial facility walk-through was conducted to familiarize the inspectors with the base building and tower layout. The facility drawings were reviewed for accuracy and suspect materials were identified on each floor. The tower was then divided into functional spaces and suspect homogeneous materials were selected for bulk sampling. Samples were collected, floor-by-floor, and placed into separate sealed plastic bags. Each sample was individually numbered and sample information was entered onto a field data sheet. Sample locations were recorded on plan drawings prepared for this purpose and are shown in Appendix B (Exhibits). Sample tools were decontaminated after each sample collection. The samples were delivered to an EPA-accredited laboratory for analysis, each accompanied by a completed chain-of-custody form.

Suspect materials were divided into three categories: surfacing materials (such as plaster and surface coatings), thermal system insulation (such as mudded TSI fittings, duct insulation, and pipe insulation), and miscellaneous material (such as floor tile, drywall and mastic). Asbestos-containing materials were classified according to:

Condition	• Good • Damaged • Significantly Damaged
Friability	• Friable • Non-friable
Potential for Disturbance	• Low Potential • Potential for Damage • Potential for Significant Damage
Disturbance Source	• Contact • Vibration • Air Flow

Friable materials are materials which can be crushed, pulverized, or reduced to powder by hand pressure. These materials were wetted with amended water prior to sampling to protect the inspector and FAA employees from potential exposure or accidental fiber release. At the inspector's discretion, personal protective equipment (PPE) was used as an added precaution.

Samples were collected using EPA guidelines for the type of suspect material. Where practical, sample locations were determined using random sampling methods. Within each area, samples were located where minimal damage would occur to facility structures or finishes. A particular suspect material may be located in various separate places throughout the tower. The EPA does not require that these materials be sampled in each location, provided the materials are of the same type, age, appearance, have the same date of installation and are sampled in accordance with AHERA requirements to provide statistically reliable data which can be extrapolated onto all remaining non-sampled areas.

AHERA protocol determines the number of samples of each material to be collected, depending on its category and amount of material present. The goal of AHERA is to insure statistically reliable data and it accomplishes this by requiring or suggesting a minimum number of samples to be collected, and in some cases, by using random sampling techniques to determine sample locations. However, in every case, AHERA relies on the judgment of inspectors who are experienced in AHERA methodology and the type of facilities being inspected. Sample collection points on each of the floors of the ATCT are identified on the Exhibits in Appendix B (Section 3.0 discusses these Exhibits in more detail).

1.3 METHOD OF ANALYSIS

Samples were analyzed in accordance with AHERA requirements using the following reference methods:

- EPA Interim Method for the Detection of Asbestos in Bulk Insulation Samples (EPA 600/M4-82020, December 1982).

- McCrone Research Institute's The Asbestos Particle Atlas.

All samples were analyzed using a polarized light microscope. Additional treatment and tests may be used as required to accurately define composition (i.e. ashing, extractions, and Transmission Electron Microscopy [TEM]). All bulk sample laboratory reports were verified through an established quality assurance procedure. Unused portions of samples are archived for a minimum of six months.

1.4 QUALITY CONTROL PROCEDURES

All samples were analyzed by laboratories accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). These laboratories participate in the NVLAP, as well as the American Industrial Hygienists Association (AIHA) Bulk Asbestos Sample Quality Assurance Program.

A minimum of five percent of all samples collected were divided into replicates and were analyzed by a laboratory other than the primary laboratory (Appendix D). Results from the two laboratories were compared for consistency.

RMCI verified all of the sample data for accuracy. This was accomplished by cross-referencing field data sheets, chain-of-custodies, and field notes.

1.5 INSPECTION LIMITS

All interior spaces and rooms owned, occupied, and/or maintained by the FAA were inspected for asbestos-containing materials. The facility roofs and attached exterior surfaces of FAA owned facilities were also inspected. Bulk samples of roofs and exterior surfaces were collected only if damage to the substrates could be avoided. RMCI did not inspect underground conduit, appurtenances, electrical systems, or any above-ground structures not directly attached to the ATCT.

1.6 INSPECTION DATE

The Spokane International Airport ATCT was inspected on January 11, 1993.

1.7 AIR TRAFFIC CONTROL TOWER CONSTRUCTION INFORMATION

The Spokane International Airport ATCT is a sponsored tower constructed in the early 1960s and is connected to a base building constructed in the early 1980s. The base building and tower are concrete structures with concrete, brick, glass, and metal exteriors. With the exception of some city-occupied areas on the first floor of the tower, the FAA occupies all areas of the tower and base building.

1.8 INSPECTION SUMMARY

The following ACM was identified in the Spokane International Airport ATCT (all quantities are approximate):

BASE BUILDING

- Administration Storage Room
  - 72 sq ft of 1 ft x 1 ft white/grey streaked floor tile and associated mastic
- Breakroom
  - 80 sq ft of 1 ft x 1 ft white/grey streaked floor tile and associated mastic (in the southern area of the room)
- Corridor 1
  - 230 sq ft of 1 ft x 1 ft white/grey streaked floor tile and associated mastic
- Corridor 2
  - 200 sq ft of 1 ft x 1 ft white/grey streaked floor tile and associated mastic
- Engine Generator Room
  - 1 lin ft of oil pipe insulation
- Locker Room
  - 144 sq ft of 1 ft x 1 ft white/grey streaked floor tile and associated mastic
- Roof
  - pipe penetration sealant (on perimeter of 1 3-inch diameter pipe)
- TELCO Room
  - 260 sq ft of 1 ft x 1 ft white/grey streaked floor tile and associated mastic

1.8 INSPECTION SUMMARY (Continued) -- all quantities are approximate.

- TRACON Equipment Room

  - 1,150 sq ft of 1 ft x 1 ft white/grey streaked floor tile and associated mastic

BASEMENT LEVEL

- Cable Vault 1

  - pipe penetration sealant (on perimeter of 4 4-inch diameter pipes; penetrating wall)

- Cable Vault 2

  - pipe penetration sealant (on perimeter of 4 4-inch diameter pipes; penetrating wall)

FIRST FLOOR

- Boiler Room

  - fire door insulation (2 doors, not sampled to avoid damage; assume ACM)
  - 55 lin ft of straight run pipe insulation
  - 45 sq ft of heat exchanger insulation
  - 2 lin ft of boiler caulking (1 in wide bead inside the boiler)
  - mudded TSI fittings not associated with hot and cold water lines (assume asbestos-contaminated)

- Electrical Room

  - fire door insulation (3 doors, not sampled to avoid damage; assume ACM)
  - 10 lin ft of straight run pipe insulation

- Elevator Equipment Room

  - 30 lin ft of straight run pipe insulation
  - 2 elevator motor pads (inaccessible for sampling; assume ACM)

- Janitor's Closet

  - 15 sq ft of 9 in x 9 in tan streaked floor tile and associated mastic

- Men's Restroom

  - 10 lin ft of straight run pipe insulation

1.8 INSPECTION SUMMARY (Continued) -- all quantities are approximate.

- Roof
  - roof mastic (around perimeter of roof and vents)

- Women's Restroom
  - 10 lin ft of straight run pipe insulation

SECOND FLOOR

- Breakroom
  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)
  - 72 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic

- Elevator Shaft
  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)

- NAVCOM Office 1
  - 225 sq ft of carpet mastic/remnant floor tile mastic (materials inseparable; carpet mastic cross-contaminated by floor tile mastic)

- NAVCOM Office 2
  - 225 sq ft of carpet mastic/remnant floor tile mastic (materials inseparable; carpet mastic cross-contaminated by floor tile mastic)

- NAVCOM Office 3
  - 225 sq ft of carpet mastic/remnant floor tile mastic (materials inseparable; carpet mastic cross-contaminated by floor tile mastic)

- Stair
  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)
  - 30 sq ft of 9 in x 9 in tan streaked floor tile and associated mastic

THIRD FLOOR

- Elevator Shaft
  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)

1.8 **INSPECTION SUMMARY (Continued) -- all quantities are approximate.**

- Stair

  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)
  - 30 sq ft of 9 in x 9 in tan streaked floor tile and associated mastic

- Vestibule

  - 72 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic

FOURTH FLOOR

- Elevator Shaft

  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)

- Stair

  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)
  - 30 sq ft of 9 in x 9 in tan streaked floor tile and associated mastic

- Vestibule

  - 72 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic

FIFTH FLOOR

- Electronic Storage Room

  - 240 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic

- Elevator Shaft

  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)

- Stair

  - 30 sq ft of 9 in x 9 in tan streaked floor tile and associated mastic

- Storage Room

  - 240 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic

1.8 **INSPECTION SUMMARY (Continued) -- all quantities are approximate.**

- Training Room
  - 240 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic
- Vestibule
  - 72 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic

SIXTH FLOOR

- Conference Room
  - 450 sq ft of 9 in x 9 in brown floor tile and associated mastic (under carpet)
- Conference Storage Room
  - 75 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic
- Elevator Shaft
  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)
- Men's Lavatory
  - 75 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic
- Stair
  - 40 sq ft of 9 in x 9 in tan streaked floor tile and associated mastic
- Vestibule
  - 62 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic
- Women's Lavatory
  - 75 sq ft of 9 in x 9 in light tan streaked floor tile and associated mastic

JUNCTION LEVEL (6.5)

- Junction Room
  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)
  - duct mastic (on seams of metal ducts)

1.8 INSPECTION SUMMARY (Continued) -- all quantities are approximate.

- Stair to Cab

  - fire door insulation (1 door, not sampled to avoid damage; assume ACM)
  - 10 sq ft of 1 ft x 1 ft brown speckled floor tile and associated mastic
  - 1 sq ft of threshold tile and associated mastic

SEVENTH FLOOR (CONTROL CAB)

- Cab Roof

  - roof mastic (around the perimeter of roof area and penetrations)

2.1 INTRODUCTION

Asbestos minerals are hydrated magnesium silicates which display a crystalline structure and occur naturally as parallel bundles of minute fibers. The physical disturbance of these bundles generally results in separation into smaller bundles of individual fibers.

Asbestos minerals are divided into two groups - serpentine and amphiboles. Serpentine minerals display a sheet or layered crystalline structure, while amphiboles demonstrate a chain-like crystalline structure. Chrysotile, a serpentine, is the most commonly used type of asbestos and accounts for approximately 95 percent of the asbestos found in buildings in the United States. In the amphibole group, amosite is the most likely asbestos type to be found in buildings, followed by crocidolite. Anthophyllite, tremolite, and actinolite are also in the amphibole group, but are of little commercial value.

2.2 ASBESTOS PRODUCTS

Asbestos has been used in more than 3000 commercial products because of its high strength and flexibility, its noncombustible properties and chemical stability, and its poor conduction of heat and electricity. Building materials which contain asbestos are referred to as Asbestos-Containing Materials, or ACM. Based on fiber release potential, ACM is classified as either: 1) friable; or 2) non-friable. Friable is defined as the ability to crush or reduce to powder by hand pressure. Under normal operating or use conditions, friable material is thought to release asbestos fibers more readily and under less disturbance than non-friable materials, thus increasing the chance for employee exposure. Below is a brief discussion of product types which use asbestos.

2.2.1 Friction Products

Asbestos is used in brake linings for automobiles, buses, trucks, railcars, industrial machinery, and in vehicle or industrial clutch linings. Friction materials are generally considered non-friable, but asbestos dust may be released during fabrication, installation, and product use.

2.2.2 Plastic Products

Plastic products include vinyl-asbestos tile (VAT), asphalt floor coverings, asphalt roof coatings, and traditional molded plastic products. The asbestos in these products is usually tightly bound. However, any sawing, drilling, or sanding will result in the release of asbestos dust.

2.2.3 Cement Pipe and Sheet

Asbestos-cement (A-C) pipe has been widely used for water and sewer mains, and is occasionally used for electrical conduit, drainage pipes, and vent pipes. Asbestos-cement sheets (transite), manufactured in flat or corrugated panels and shingles, have been used primarily for roofing and siding.

The normal use of A-C pipe for water or sewer mains has been shown to release asbestos fibers to the fluid being carried through them. The asbestos in A-C pipe and sheets is tightly bound, and is not released to the air under normal use. However, any sawing, drilling or sanding of these materials during installation, renovation or removal will result in fiber releases. In addition, normal breakage and crushing involved in the demolition of structures can result in asbestos fiber release. For this reason, these materials are subject to NESHAP regulations during demolition operations.

2.2.4 Paper Products

Roofing felts, gaskets, pipeline wrap, insulating paper, aircell, and other paper products were manufactured using asbestos fibers instead of cellulose. The asbestos fibers in most paper products are sufficiently bound to prevent their release during normal product use, however, some are considered friable. In addition, cutting or tearing the material during installation, use, or removal may result in a release of asbestos dust.

2.2.5 Textile Products

Asbestos yarn, cloth, rope, and other textiles are used to manufacture fire-resistant curtains or blankets, protective clothing, gaskets, vibration collars, electrical insulation, thermal insulation, and packing seals. These raw textile products have a high asbestos content (85 percent). However, they are typically coated or impregnated with polymers before assembly into final products. These products may release asbestos fibers if cut or torn, or for some products, during normal use.

2.2.6 Thermal Insulation and Decorative Products

These types of products were commonly applied to steel I-beams and decks, concrete ceilings, and walls. Most of these materials are considered friable and may contain 50 to 90 percent asbestos. Most sprayed-on materials were banned for fireproofing or insulation in 1973, and for decorative purposes in 1978.

Asbestos insulation board was used as a thermal or fireproofing barrier in many types of walls and ceilings, as well as ducts and pipe enclosures. High asbestos dust levels have been measured during many board handling operations, including simple unloading of uncut sheets.

2.2.7 Thermal System Insulation

Asbestos-containing thermal system insulation (TSI) generally refers to sprayed, troweled, molded (prefabricated), and/or wet-applied asbestos insulation used to cover boilers, piping, and tank heating systems. These materials generally have an asbestos content ranging from 50 to 90 percent by volume, and were placed on systems to increase energy efficiency and prevent condensation. TSI coverings are considered friable.

Heating, Ventilation, and Air Conditioning (HVAC) systems, including pipe and boiler equipment, were also covered with ACM to increase their efficiency and reduce energy requirements. HVAC ducting may also be covered with aircell-like materials, batting, felts, transite-like sheeting, paints, mastics, and wrap.

2.2.8 Other Asbestos Uses

Other uses of asbestos have included exterior siding shingles, shotgun shell base wads, asphalt paving mix, spackle and joint compounds, artificial logs for gas fireplaces, artificial snow, and various thermal paints. Use of asbestos as an ingredient in spackle and joint compounds was banned in 1978.

2.3 ASBESTOS CONTENT DETERMINATION

The positive identification of asbestos in a material or product can only be made through laboratory analysis. Visual inspection or common knowledge is not a positive test. The asbestos content of suspect materials is determined by collecting a bulk sample and having it analyzed by polarized light microscopy (PLM). The PLM technique determines both the percent and species of asbestos in the bulk sample.

If an asbestos fiber release is suspected, air samples may be collected to determine the ambient air concentration of fibers in a given location or workplace. These samples are analyzed by phase contrast microscopy (PCM) to determine if suspect fibers are present in the ambient air samples based on a specific morphology; i.e., shape and size. In this instance, a "fiber" refers only to a specific shape and size, and does not specifically mean asbestos fiber. To confirm the presence of asbestos, the air samples must be analyzed by either scanning or transmission electron microscopy (SEM/TEM) techniques. RMCI did not collect air samples in this tower.

Trace amounts of asbestos can be detected on surfaces through the collection of vacuum samples. These samples are vacuumed onto an air collection cassette and then analyzed by PCM or TEM. Tape samples are also used to detect the presence of ACM on surfaces by collecting the material on an adhesive surface. The tape is then mounted on a clear slide and analyzed by PLM.

2.4 ASBESTOS HEALTH EFFECTS AND ROUTES OF ENTRY

Asbestos exposure may be occupational, para-occupational, or environmental in origin. Although asbestos exposure may have occurred during childhood, the manifestation of asbestos-related diseases may not occur for many years. Furthermore, asbestos may enhance the carcinogenic effects of other materials. Most of the conclusive evidence regarding asbestos exposure health effects is derived from studies of occupational exposure of asbestos-application workers. These workers experienced asbestos fiber concentrations many times higher than those encountered by the public or by most office workers in buildings containing ACM. Individuals who work in facilities which contain friable ACM may experience higher than normal risks when compared to the general public. The available data, however, are not conclusive and do not allow precise estimates of actual risk.

The primary route of exposure leading to the development of a disease caused by asbestos is inhalation of airborne fibers. Although digestion and dermal penetration have been demonstrated as possible exposure routes in clinical and laboratory studies, they generally are not viewed as occupational exposure routes in most settings. In most cases where negative health effects occurred due to asbestos exposure, the diseases manifested themselves in the respiratory system.

2.4.1 The Human Respiratory System

The respiratory tract is the channel by which air flows into and out of the lungs. The respiratory system is sensitive to bacteria, viruses, and airborne particles that can be inhaled. Reaction to these irritants can disrupt the functioning of the system, resulting in ailments such as the common cold, hay fever, sinusitis, sore throat, acute or chronic bronchitis, emphysema, and lung cancer.

When air-suspended asbestos particles enter the airway and reach air sacs in the lungs, white blood cells may attempt to engulf and digest the particles. As a secondary defense, the white blood cells may also deposit a calcium-like coating on the fiber. These coated fibers clog and scar the lung tissue, and accumulate if exposure continues. As a result, the lungs may lose their ability to supply oxygen to the blood stream. If the white blood cells do not engulf the fibers and the body does not eliminate the foreign material, the fiber may migrate through the lung tissue to the mesothelium or enter the bloodstream. This may result in the development of a carcinoma in other organs or tissues of the body.

2.4.2 Epidemiology

More than 30 major epidemiological studies have been conducted to determine the health effects of occupational asbestos exposure. These data suggest that asbestos is a human carcinogen which causes lung cancer, mesothelioma, and some other cancers, as well as asbestosis.

Epidemiological data suggest a synergistic relationship between asbestos and smoking. Workers exposed to the same level of asbestos as insulation workers historically increase their risk of developing lung cancer by five times. The smoker exposed to asbestos fibers is at least 50 times more likely to develop lung cancer than non-smokers who do not work with asbestos.

2.4.3 Diseases Associated With Asbestos Exposures

The link between asbestos and the lung disease "asbestosis" dates to 1900. Autopsy reports from 1928 to 1949 indicated that a large number of persons who died with asbestosis also had lung cancer. In the 1960s the link between asbestos and a rare form of cancer called "mesothelioma" was established. Diseases attributed to asbestos exposures are asbestosis, mesothelioma, and lung cancer. Other diseases noted in workers exposed to asbestos include cancer of the larynx, esophagus, stomach, colon-rectum, kidney, and pancreas. However, this correlation is not conclusive.